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ABSTRACT

Described is a project to investigate the effectiveness of self monitoring on the behavior of 8 emotionally disturbed and two educable mentally retarded elementary students. It is explained that baseline information on target behavior was collected, coded, and analyzed with the help of CATTS (computer assisted training system). Findings are detailed for specific target behaviors, interventions, and outcomes of the programs, and are said to suggest that self monitoring may be used as a means of altering disruptive students' academic and uncooperative behavior. (CL)

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THE USE OF CATTS METHODOLOGY FOR TEACHING CHILDREN SELF-CONTROL

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The Use of CATTS Methodology for Teaching Children Self-Control

Lewis Polsgrove

Children's behavior can be changed in various situations using a variety of techniques, as demonstrated in a vast array of studies. Behavioral technology is a powerful tool for controlling a wide range of human behavior--with or without an individual's awareness or approval. However, two problems have arisen concerning this approach: the first deals with the specificity/generalizability of behavior (Mischel, 1968); the other is related to the dichotomy of personal freedom and control (Thoresen and Mahoney, 1974; Graubard, Rosenberg and Miller, 1969; Winett and Winkler, 1972).

There is evidence that control of a child's disturbed or disturbing behavior in one situation does not assure that control will be maintained across situations (Mischel, 1968). A child may perform ideally in a special class but remain a management problem on the playground, in other classes, or at home. Treatment programs may fail because once the child leaves the special treatment milieu, he/she lacks the behavioral competence and/or "internalized" controls to deal with a new situation. These cases point heuristically to the necessity training for children in the development of exportable social skills, skills that can be employed outside the structured treatment environment.

One approach to the development of generalizable social skills in children may be borrowed from methods designed to develop self-control. If children could be trained to functionally analyze environmental events, to better predict outcomes based on their behavioral performance, to set goals and apply contingent consequences to themselves, then their excessive reliance on institutional controls might be minimized. Children could receive training in behavioral alternatives and the analysis of the variables con-

trolling their behaviors. These children could experience increased individual freedom due to the additional options and opportunities available to them (Worell & Nelson, 1974).

Recent theoretical analysis has conceptualized "self-control" as the final result of the process of self-regulation (Kanfer & Karoly, 1972). The self-regulatory process involves self-monitoring, goal-setting and self-evaluation/self-reinforcement. Self-monitoring, the process of recording one's covert or overt behavior, involves utilizing feedback information from the external environment and individual responses. By trying out responses employed in a former situation, and evaluating the adequacy of his performance, an individual can establish appropriate performance standards. This comparison of established goals with performance, i.e. self-evaluation serves as a cue or discriminative stimulus for self-reinforcement. The underlying assumption inherent in this process is that the person who demonstrates self-control is able to administer positive and negative internal and external consequences contingent on meeting predetermined standards.

The current emphasis in child behavior management is moving toward exploring methods to train children to assume greater responsibility for their behavior. In general, studies conducted in classroom situations have yielded promising results. The training of children in various aspects of behavior self-regulation is successful in a range of different situations: in increasing accuracy of academic performance (Glynn, 1970; Lovitt & Cutiss, 1969; Broden, Hall & Mitts, 1971); in reducing the frequency of disruptive classroom behavior (Frederickson & Frederickson, 1975; Santogrossi, O'Leary, Romanczyk & Kaufman, 1973; Bolstad & Johnson, 1972); and in increasing attending behaviors (Glynn & Thomas, 1973). The preliminary results in these studies indicate that after children are given pretraining in a token economy system, they can gradually assume responsibility for appropriately

administering self-reinforcing events.

Confounding results are frequently found in classroom studies on self-regulation. The most common experimental errors involve regulation of teacher feedback and analyzing the teacher/observer role independently of the self-regulatory method. In many of these studies the results can be interpreted to be due to the teacher's reinforcement, placebo/novelty effects, or discriminative stimulus properties of the teacher and observer. Further research appeared necessary to investigate these issues and to determine the viability of self-regulatory methods which are independent of procedural issues. More specifically, the effect of self-monitoring as a "reactive" training technique required further exploration, and the amount of teacher support required to maintain its reactivity needed to be determined (Thoresen & Mahoney, 1974).

To date there have been few studies that have looked at the use of self-monitoring, per. se., as a technique for changing children's behavior. Lovitt (1973) reported several studies in which elementary aged children were required to schedule their own subjects and record problem behaviors. These studies indicate that self-monitoring may be a successful technique especially when children have received prior training in a token economy system.

In self-monitoring and self-reinforcement prior to exposure to a token system was also attempted by Santogrossi, et al. (1973). In this study adolescents confined to a psychiatric hospital were unable to successfully regulate use of self-monitoring and contingent self-reinforcement to maintain appropriate social behavior. This study suggests that for certain clinical population, especially individuals who are highly manipulative, prior training in self- gulation may be essential.

Another study reported by Broden, Hall & Mitts (1971) provided some indication that self-monitoring combined with weekly evaluation by a school counselor was useful in increasing attending behaviors in an pre-adolescent girl. Although the data are skimpy, and of questionable validity, they suggested that self-monitoring may be a useful technique for maintaining desirable academic behavior--especially when students are motivated to change. A related study by the same investigators failed to effectively control the disruptive behaviors of an unmotivated pre-adolescent boy.

These results pointed up the necessity for further investigation of self-monitoring as a reactive treatment in the classroom. Several research questions have arisen regarding the effects of self-monitoring: (1) the effectiveness of self-monitoring as a behavioral change mechanism, (2) the degree to which external consequences influence this procedure, (3) the effectiveness of self-monitoring in altering covert and subsequent overt behavior in children, (4) the benefits, if any, of having children record antecedents and consequences of behavior, and (5) the effects of initiating a self-monitoring program without initial exposure to a token economy system.

The present series of studies was intended as a pilot project for exploring the feasibility of combining a self-monitoring approach with CATTS technology (Semmel, 1972). It was hypothesized that the viability of self-monitoring could be enhanced by providing teachers with computerized feedback showing a student's progress under the self-management condition. A secondary goal of this project was to determine the problems inherent in field research of this type, including variables that influence teacher and pupil participation, and the problems of using an observation system which analyzes the teacher-pupil interactions. The final goal was to introduce teacher/observers to the prospect of using a new management technique for improving the classroom behavior of their students.

METHOD

Subjects

The project was conducted in two elementary schools in Indianapolis, Indiana. Four special education classes were selected as the sites for the studies. Classrooms A, B, and C were self-contained special classes for children labeled "emotionally-disturbed." Classroom D was composed of children diagnosed as "educably mentally retarded." A breakdown of students and teachers according to various demographic variables is given in Table 1.

Table 1

SITE	SUBJECTS				TEACHER	
	N	# Cauc.	# Negro	Age	Ed.	Exp.	Sex
A	8	2M	6M	10-12	M.A.	5	F
B	8	4M	4M	10-12	M.A.	4	M
C	6	5M,1F	--	8-10	M.A.	6	F
D	1		1	11	M.A.	4	F

Demographic analysis of student/teacher variables. (Cauc. = white, Negro = black, Ed. = educational level, Exp. = years experience, M = male, F = female.)

Apparatus

Classroom observations were coded by use of standard touch-tone telephones and DATAMYTE recording instruments. DATAMYTE instruments consisted of a portable battery pack, digital key board and attached tape recorder.

Direct hookup with a computer terminal via telephone was possible when telephones were used for recording classroom data. Use of the DATAMYTE recorders required that data first be recorded on cassette tape and later be fed into the computer for processing. These instruments, when operating ideally, allow for rapid printout of teacher-pupil coded classroom interactions. The computer terminal was located in Bloomington, Indiana, 60 miles from the field sites.

Procedure

Selection of students and target behaviors: Since the project was concerned primarily with investigating the effectiveness of various applications of self-monitoring in a variety of situations, teachers were first asked to select children from their classrooms who were in need of training in self-regulation, such as those who did not seem to be aware of their actions, those who presented problems with disruptive behavior, and those who were withdrawn in their social interactions. Then, teachers were interviewed regarding the type of problem manifested by the child. This process sought to isolate and define specific target behaviors for intervention.

Observation: Once the target behavior was isolated, a baseline was taken using classroom observers and collecting data on the teacher-pupil interactions. Observers collected baseline information three days per week, 30 minutes per day, for the duration of the study. Observations were taken by use of the Socio Behavioral Interaction (SIS) observation system (Brownsmith, 1976). This system yielded information on the specific moment-by-moment teacher-pupil-pupil interactions. Observers in each classroom coded behavioral information via phone terminals and DATAMYTE recording instruments, which were connected to the CATTS system at the Center for Innovation in Teaching the Handicapped, Bloomington, Indiana. Teacher feedback was provided in the form of a computer printout revealing the percentages

of teacher-pupil and pupil-pupil social interactions in the classroom.

The data were also summarized so that the percentage of cooperative and uncooperative behaviors emitted by the students, the percentage of teacher feedback to the students, the time, situation, and types of activities were all depicted for each observation session.

A summary of the percents of student cooperative and uncooperative behavior with teachers, peers, objects, and themselves was used to track the amount of student changes taking place during period of study. Student on-task behavior was calculated by combining the percent of teacher cooperation, peer cooperation in teacher-sanctioned activities, and cooperative behavior displayed while working with an object. These data were graphed for each of the pupils participating in the project. The percentage of teacher reinforcement was also graphed in some instances.

Interventions: Interventions were tailored to meet the individual child's needs. Once the specific problem behaviors were identified, a self-monitoring program was written for each child. Each plan was unique. However, each followed an ABAB (Sidman, 1960) format. Every change in treatment procedure was planned, and an intervention schedule was devised for each child. These plans were explained to the teachers prior to their inception. Generally, the student intervention programs called for a student self-observation period, an observation and self-recording period, and a teacher-feedback period.

RESULTS

The specific target behaviors, interventions, and outcomes of the programs are given below. Each classroom and target child within the classroom are described, as well as the computer analysis which was re-

turned to the teacher. The overall effects of the pilot project in terms of behavioral changes are listed.

Classroom A. Classroom A contained two children with similar problems. Students one and two were 11 year-old boys who presented difficulties in attending to their assigned academic tasks. Informal observation revealed that much of their class time was spent talking to their peers, in "day-dreaming" and in making frequent trips to various parts of the classroom and school. The percentage of time the pupil spent in "on-task" activities was selected as the intervention target. The intervention programs for the children involved five phases: Phase I entailed the taking of baseline information for ten-days in which data observational data was collected. The 10-day Phase II involved having the children record the number of their off-task behaviors. In Phase III the self-recording was discontinued for five days to determine what effects behavioral self-recording alone might have.

In Phase IV of this study the teacher was instructed to increase her praise rate for on-task behavior. At the same time, observational data was to be provided here by the researchers as a form of feedback on her efforts. The teacher was also scheduled to evaluate the children's behavior at the end of the day. These procedures are similar to those used successfully by Lovitt & Curtis (1969) without the control of the teacher-pupil interaction or the feedback component.

In the fifth and final phase of this study the children were scheduled to continue their self-recording without the teacher's involvement. This program was designed to test the effects of self-monitoring as a reactive behavioral change technique while teacher reinforcement was being controlled.

Student 1. The data collected on student 1 in Classroom A are displayed in Figure 1. (See Figure 1). As can be seen in this figure, student on-task behavior showed some changes over the five phases of the project. During baseline on-task behavior averaged 47% but declined during the second, "self-monitoring only" phase, to a mean of 22%. In phase three when the teacher was instructed to increase her praise rate and conduct daily evaluations, behavior increased to 59% but dropped to an average 51% in the fifth and final phase.

Uncooperative behavior with peers is also plotted in Figure 1. During baseline uncooperative-with-peer behavior averaged 16% and rose to 29% in the second phase. In phase three negative behavior directed at peers fell to 9% and in the final phase (five) was maintained at below the baseline level (13%).

These results ostensibly suggest that self-monitoring alone produced little effects, but when combined with positive teacher feedback, may increase academic response rate and decrease negative peer-directed behavior. However, this interpretation is questionable due to a number of procedural contaminations. Most notably, during the course of the study, the observational data reveal that the teacher did quite the opposite of the intended instructions. Not only was positive verbal reinforcement negligible throughout the study, the data reveal that the teacher actually increased her use of verbal aversive controls during the third and fourth phases. In the first two phases the teacher engaged in negative feedback three percent and 2½ percent of the time, respectively, while in the third and fourth phase she increased her negative feedback to 4½ and 5½ percent. Thus it appears that self-monitoring with negative teacher feedback may have been responsible for the observed changes.

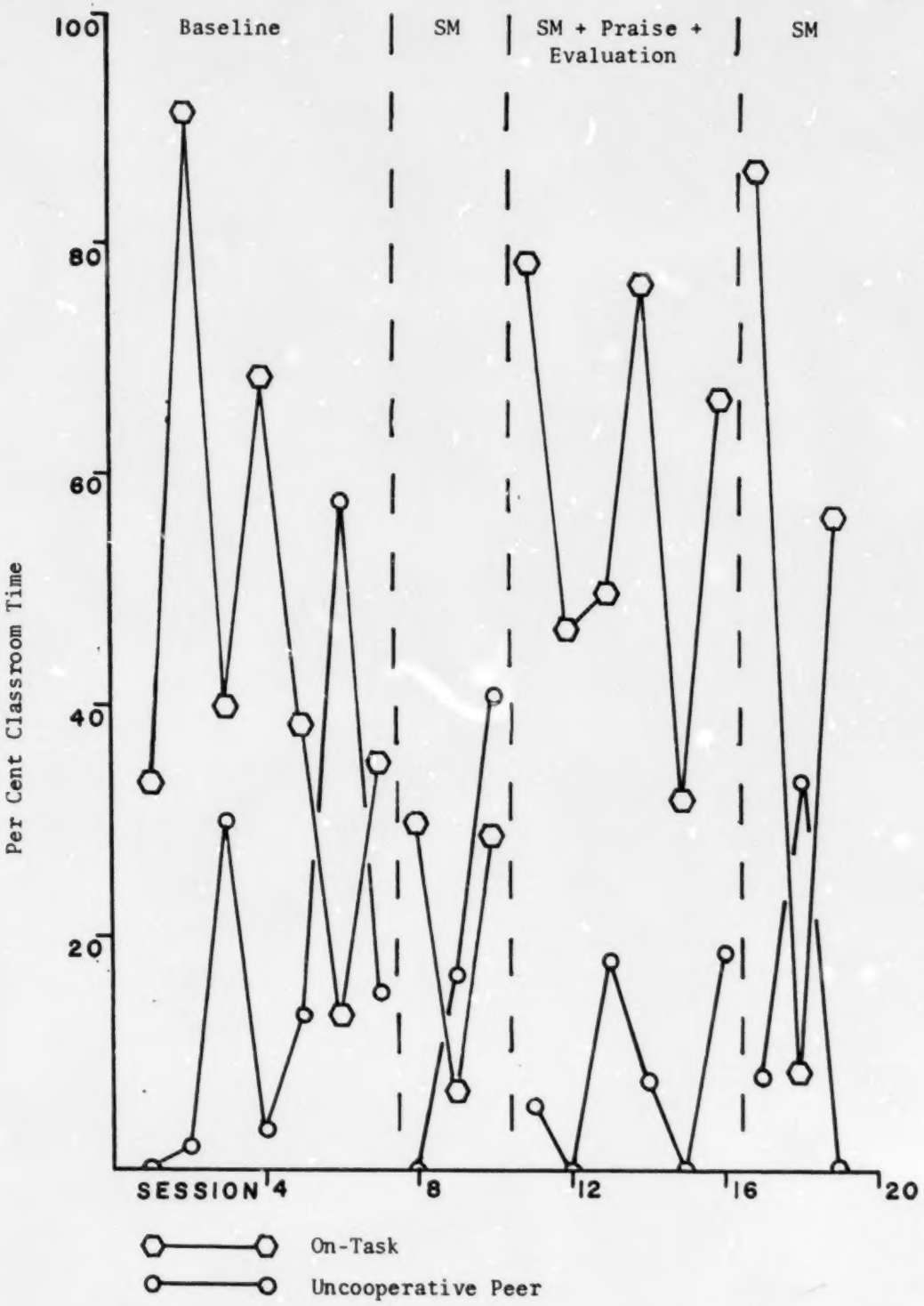

Figure 1: Percentages of Cooperative (On-Task) and Uncooperative Peer Behavior as a Function of Self-Monitoring--Classroom A, Student 1.

Student 2. Due to the high number of unanticipated absences during the observation period, the intervention program for the second student in Classroom A had to be modified to a baseline-intervention design. The data taken on this student is shown in Figure 2. (See Figure 2). Inspection of these results reveals that this boy's on-task behavior was declining during the baseline period and that he was on-task only an average 34 percent of the time, while uncooperative behavior averaged nine percent during baseline. In the intervention period, (the self-monitoring phase) this student's on-task behavior increased to an average 55 percent. Moreover, his uncooperative behavior dropped to about four percent during this time. There was no appreciable increase in the teacher's social reinforcement from the baseline to the intervention periods, indicating that this was a relatively unimportant factor in influencing this child's behavior.

Data taken on the teacher depicts little change in the percentage of positive social reinforcement during the course of the study. This indicates that in Phase III the teacher only gave the student feedback at the end of the day. She did not increase the amount of social reinforcement to the target student in Phase III as instructed. This suggests that teacher attention in the form of daily evaluation along with self-monitoring may have made a difference in the students' increasing his on-task behavior.

Classroom B. Two students were initially selected as subjects of study in Classroom B. Teacher interviews revealed that student 1, an 11 year-old boy, was highly distractible and frequently entered into arguments with the other students. The target behavior isolated for intervention was "interfering in others' affairs." The teacher felt that if this child could be made aware of the instances in which he involved himself in others' interactions, he would achieve more in academic areas and the entire class would profit from the reduced disruption due to his behavior.

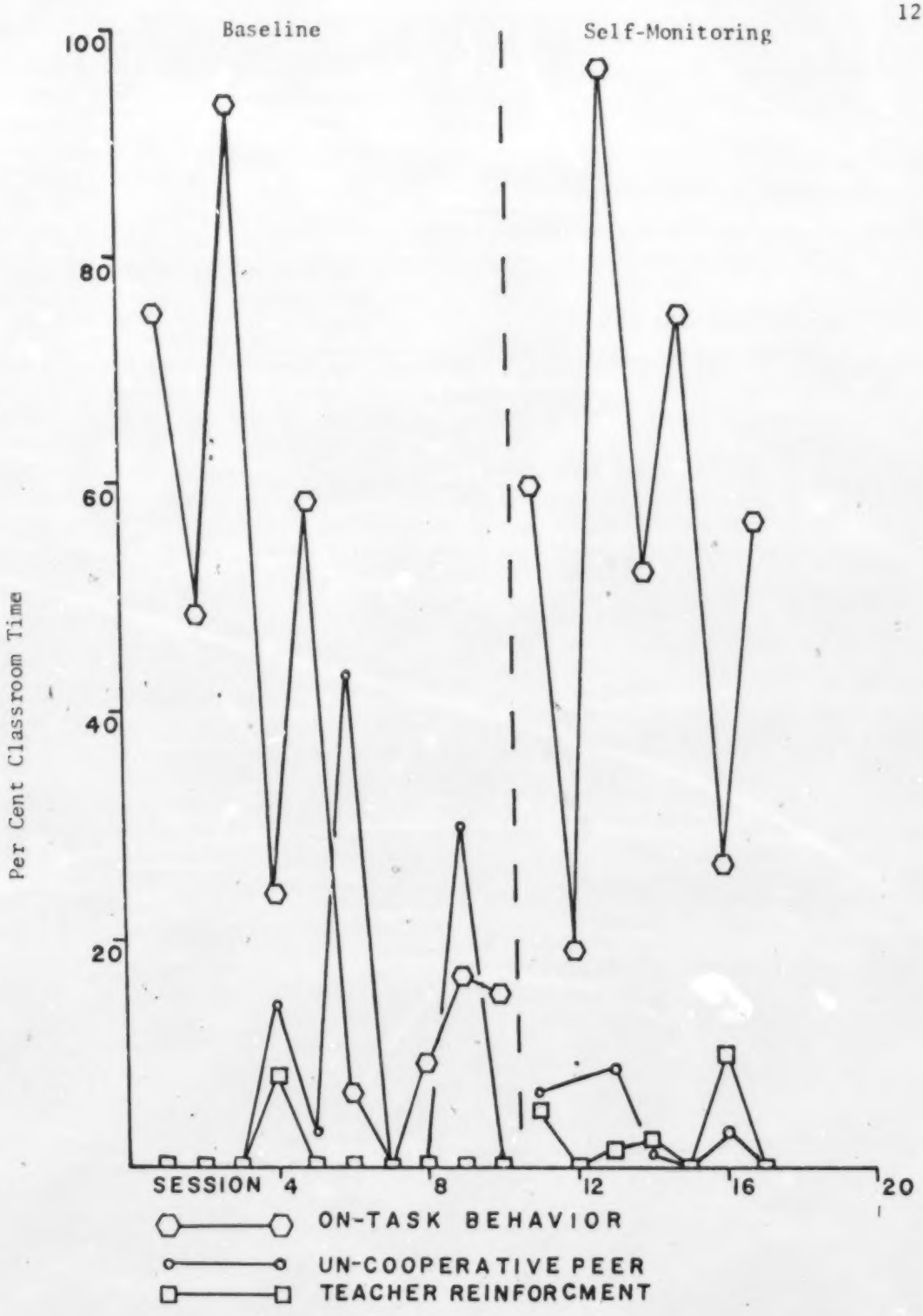

Figure 2: Percentages of On Task, Peer Uncooperative Behavior and Teacher Reinforcement as a Function of Self-Monitoring--Classroom A, Student 2.

The design for the intervention plan for student 1 was as follows: A 10-day baseline was to be taken. In Phase I the student was to be instructed to keep a record and chart daily the number of times during the day that he observed himself "butting in" on social interactions between other members of the class. After two weeks in Phase II, a "reversal" Phase III was planned during which the program in Phase II was to be discontinued. Next, in Phase IV, self-recording, charting, and daily teacher evaluation was planned for a two-week period. Phase V was planned as a 4-week self-recording/charting period in which the teacher was to increase his moment by moment verbal praise for on-task behavior of student 1.

The second student in Classroom B was described by the teacher in interviews as "highly distractible, almost frantic." Although he presented problems with interpersonal aggression, the teacher felt that his "off-task" behavior was the highest difficulty this student faced, especially unnecessary noise. It was decided to increase the amount of time student 2 spent on academic behavior.

The plan of intervention for student 2 was first to take baseline data on his behavior. The second stage of the intervention plan entailed having him record and chart his behavior for three weeks; the teacher was to evaluate his program with him at the end of each day. It was planned to discontinue the teacher evaluation period in stage three of the study, teaching the student to continue self-recording and charting his behavior daily. This third stage was scheduled to last three weeks. The final stage planned was a "return to baseline" condition in which both behavioral self-recording and charting would be discontinued.

These studies were intended to coincide with each other in order to provide information about the degree of teacher support required to facil-

itate self-monitoring classroom problem behaviors. Throughout each of the studies the amount of teacher feedback to the students was recorded as a means of controlling this variable.

Student 1. This student was dropped from the project because of excessive absences.

Student 2. The teacher in Classroom B identified two problem behaviors characteristic of this boy--off-task and uncooperative with peers. Observational data, however, revealed that he actually demonstrated a high percentage (87%) of academically-oriented behavior during baseline as shown in Figure 3 (see Figure 3). Although on-task behavior was observed to increase by about one percentage point at intervention, this increase was negligible and its significance was overweighed by ceiling effects due to the high percentage of on-task behavior produced during baseline. Uncooperative behavior oriented toward peers appeared to be a real problem during baseline. Observations revealed that during this period this boy exhibited negatively--toned behavior approximately 10% of the time. Uncooperative-peer behavior fell to approximately five percent during the period in which he was required to monitor his off-task behavior. During this same period teacher reinforcement remained approximately the same--an average of 4-5 percent.

Student 3. Only baseline data was collected for student 3. These data appear in Figure 4 (see Figure 4). According to the posted results this student was on-task approximately 47 percent of the time. Combined uncooperative behavior with teacher and peer was about three percent during this period. These results, as compared with those of Werry and Quay (1969), suggest that this child's academically-oriented behavior did not significantly depart from what would normally be expected from a behaviorally disordered child in a special education self-contained classroom.

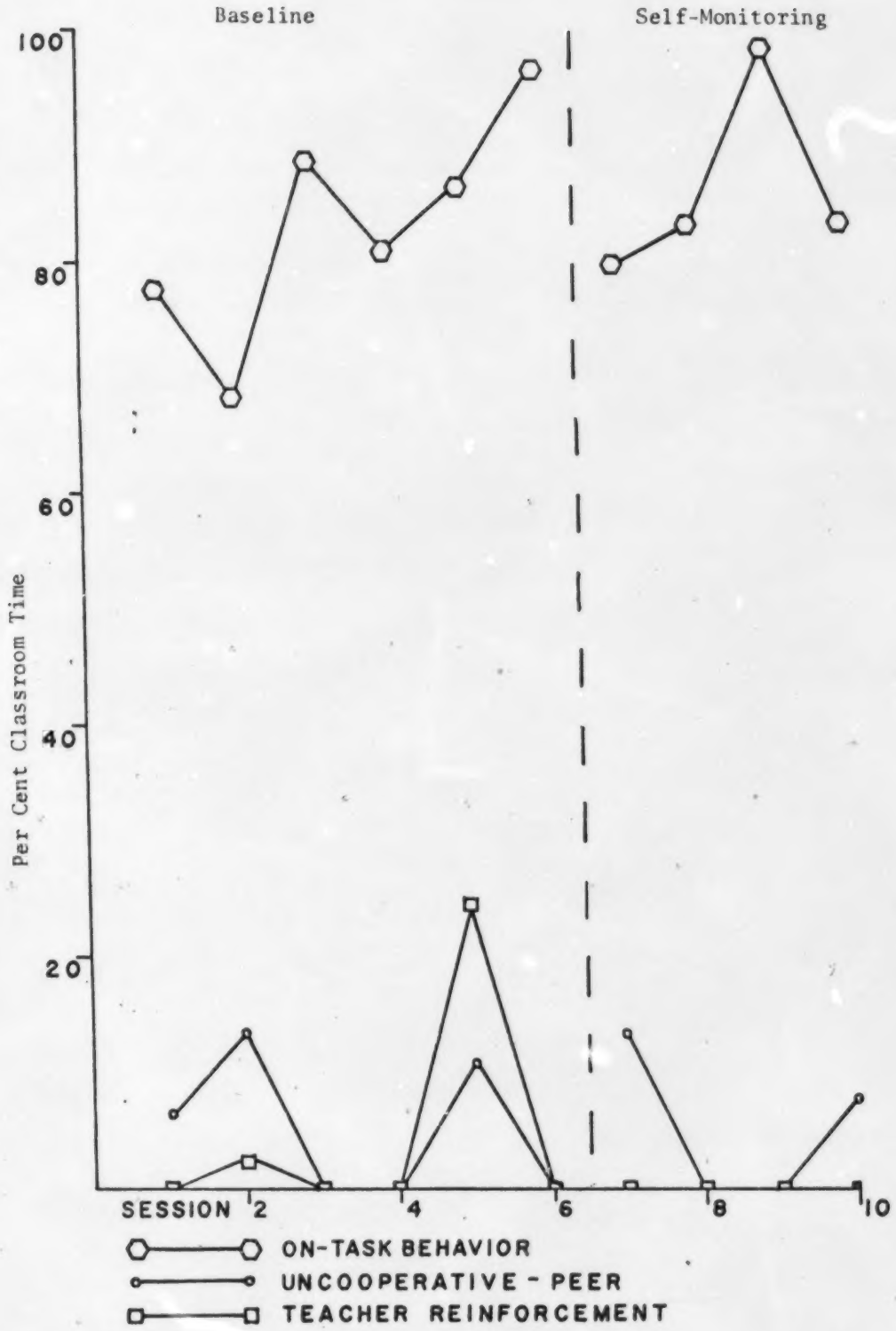

Figure 3: Percentages of Cooperative, Uncooperative Peer Behaviors, and Teacher Reinforcement as a Function of Self-Monitoring--Classroom B, Student 2.

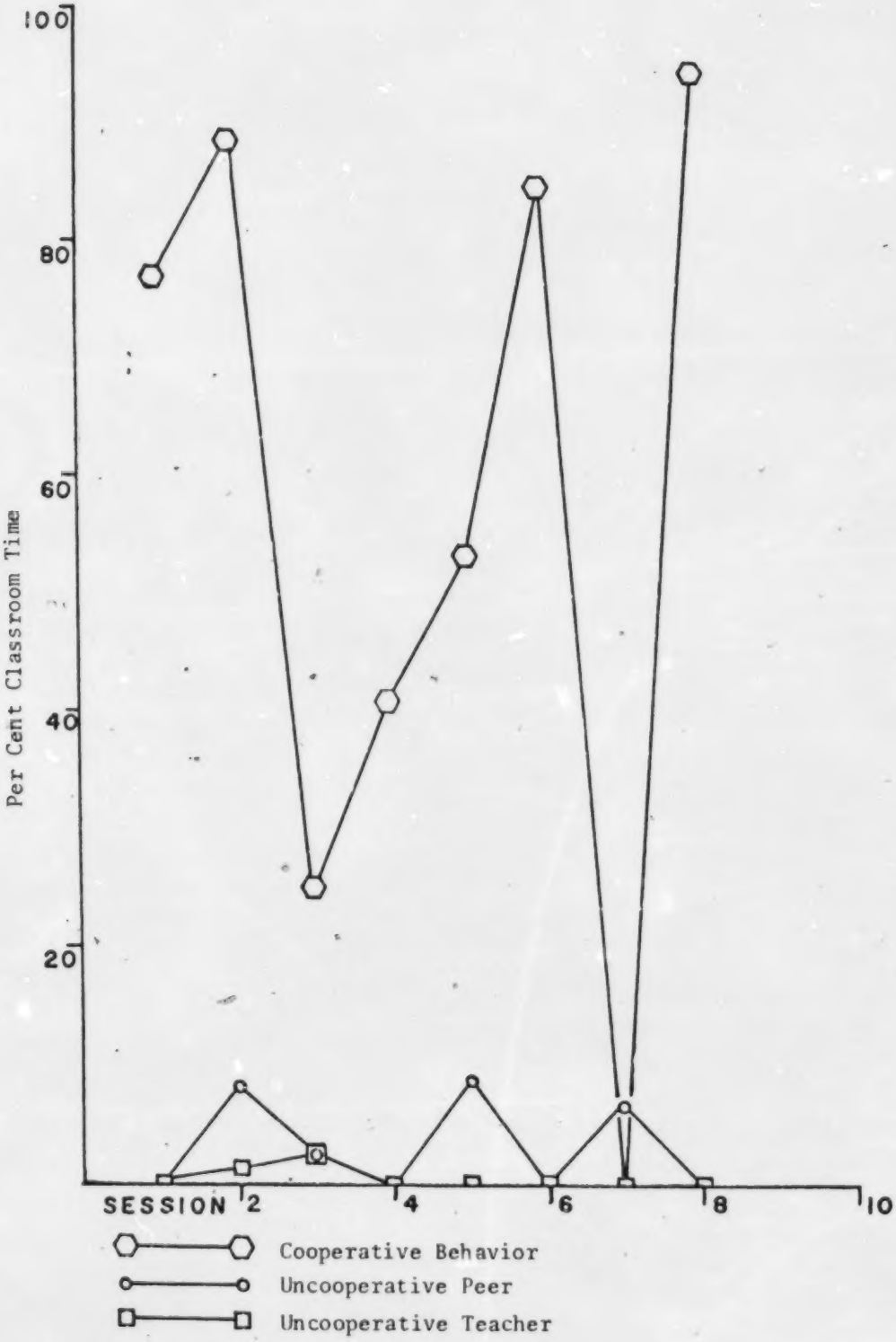

Figure 4: Percentages of Cooperative (On-Task), Uncooperative Teacher, and Uncooperative Peer Behaviors--Classroom B, Student 3.

Classroom C. Four students were selected as subjects for study in Classroom C. Individual intervention plans were drawn up and preliminary observations were taken. However, the teacher in Classroom C asked to withdraw from the project during the baseline period. Her stated reason for this was that she was "uncomfortable" having observers in her classroom and that she felt they might become disruptive influence on the children. Although there was no indication that the observers were distracting to the children, it was decided to terminate the projects planned for this class.

Baseline data collection was initiated on several children in this classroom. Because these data are not complete, they will not be offered for interpretation.

Classroom D. Two students were chosen for intervention projects in Classroom D. Preliminary observations were made and an intervention plan was drawn up for student 1, but just prior to the beginning of the study, she was removed by administrative personnel because she had been mistakenly placed in an "EMR" classroom instead of one for learning disabled children.

The second student in Classroom D was a twelve-year old boy who was described by the teacher as highly distractible. Informal observation by the investigator confirmed this description as the child spent much of his time fidgeting in his seat, talking with and entertaining his classmates, and in unauthorized movement about the classroom. Through teacher interviews it was decided that the appropriate intervention would be to strengthen his academic--"on-task"--behavior in an effort to reduce his distractibility.

The intervention plan for student 2 in Classroom D was to take baseline information for nine observation periods. Next, the teacher was to modify her existing token economy system to make it personally appealing to this child: he was to be given points exchangeable for daily basketball practice

for prescribed levels of on-task behaviors. This phase was scheduled to last for four weeks. In the third phase of this study, the student was to record instances of "on-task" behavior--whenever he observed himself working, he was to tally this on a recording form. The third phase was intended to last for 2 weeks while the token program was continued. Finally, it was planned to fade out the token program over a period of one week while the self-monitoring continued. The final phase was to entail having the student both record and chart his behavior while the teacher provided a daily evaluation of his program. This program was designed to determine how effective self-monitoring alone could be following a token program.

Student 2. Data taken on this student's behavior were limited because of his excessive absences. Hence, only six observation sessions could be scheduled during baseline and only seven during the intervention period. Moreover, a reversal phase could not be included due to the paucity of data being collected. The results shown in Figure 5 reveal that during baseline this child averaged 68% on-task behavior (see Figure 5). Comparatively, his on-task behavior rose to 78% during intervention--an approximate 10% increase. Accordingly, uncooperative behavior directed at peers was observed to be approximately 9% during baseline. This fell to near four percent during the intervention phase. Although the teacher was scheduled to increase her praise rate during intervention, there was no discernable increase in this function during intervention. Another problem encountered in working with this child was that the teacher also was utilizing the services of the school psychologist at the same time as the study was being conducted. This fact was not revealed until the last days of the study. For this reason, the results must be considered questionable.

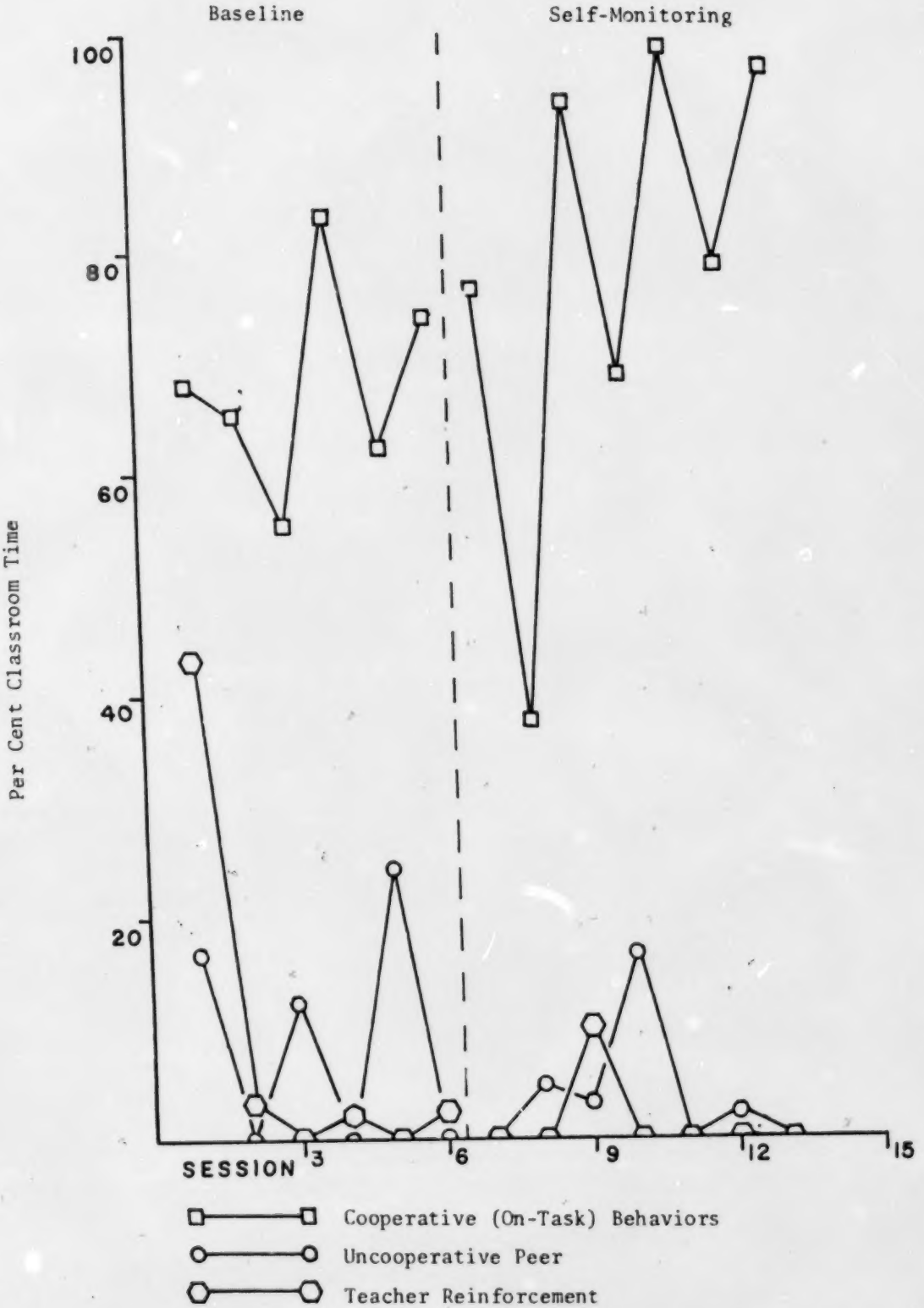

Figure 5: Percentages of Cooperative (On-Task), Uncooperative Peer Behaviors and Teacher Reinforcement--Classroom D, Student 1.

DISCUSSION

This series of studies provides some data to suggest that self-monitoring may be used as a means of alterning disruptive children's academic and uncooperative behavior. The programs generally show an improvement in children's behavior over the peri·d spanning the studies. The conclusion that self-monitoring alone may have been the sole reactive element responsible for this change must not be accepted in view of the present results. Although evidence supporting this concept comes in the first study, in which self-monitoring was varied along with teacher praise and daily feedback, the lack of data and failure to include a reversal phase in the design fails to clearly isolate the effects of self-monitoring. Moreover, contamination from outside sources--the teacher and principal both set up "extracurricular" change programs for the target children in Classroom A unknown to the experimenter--casts further doubt on the viability of self-monitoring as the cause for the observed changed in the students' behaviors. A similar problem was encountered in Classroom D when it was discovered late in the intervention phase that the teacher, working in conjunction with a school psychologist, had subjected the student to a token program at the same time that she was working with the experimenter on this project.

While, in general, these projects show changes in the selected children's behaviors, most situations were beleaguered by experimental problems inherent in the school environment. Four problems poor student attendance, teacher absences, schedule alternations, and the failure of project teachers to comply procedurally with project demands, contributed significantly to do paucity of data and to the erratical treatment procedures characteristic of these studies.

Other problem sources lay in the technological and data collection procedures used. Although an important aspect of each of the planned intervention strategies was the feedback component inherent in the CATTS system, information returned to the teacher was usually three or more weeks late in being processed. Much of the feedback information never reached the teacher due to frequent equipment breakdowns of the portable data collection apparatuses, which resulted in a great loss of data. Phone line hook-ups with the computer were inadequate and inoperable during several weeks of the data collection period; this not only resulted in loss of information but also created a morale problem among the coders. Second, the lack of a field coordinator made systematic observation difficult at best. Not only was the data difficult for the observers to keep track of, but on a number of occasions, observers failed to code any information in the classroom. Potentially usable data had to be discarded because of faulty logging in and logging out procedures used by observers. Moreover, the observation system itself was so complex that it hampered accurate data collection by observers. It was difficult, for example, to determine the percentage of time a child spent on a particular activity and whether this activity was sanctioned by the teacher. In short, the accuracy of information on the observational system was sacrificed in an effort to account for all of the particular activities of the child within the classroom.

These studies were supremely successful in providing information that could be drawn upon to avoid some of the pitfalls which may be encountered in future in situ research investigations. The major conclusions to be drawn from this series of experiments are, first, that computerized programs to provide feedback to teachers may not be feasible in distal locations unless an on-site computer terminal can be made available to provide teachers with

ready information on their performances. Secondly, records of teacher-pupil interactions may be more effectively and economically collected by observers using paper and pencil recording sheets for limited populations.

The following recommendations are made as a direct result of the present experiments:

1. A field coordinator is necessary in distal locations to monitor observers, take reliability checks and keep track of data collected.
2. Data should be collected daily in prespecified, randomly selected time blocks.
3. Contrast data from randomly selected students should be taken to provide control information against which target children's behavior could be compared.
4. Observers should be involved in the classroom from the first of the school year to avoid possible disruption of the classroom ecology.
5. Teachers should receive a written account of the critical events in a project, giving times when various phases of the project and detailed instructions regarding the requirements of their participation at various stages.
6. Teachers should receive some type of remuneration for their efforts.
7. It should be clearly stipulated in a contract that the target students should not be involved in any ongoing or future change programs during the course of the study other than that related to the project.
8. A research report on the status of the data collection should be made weekly to the project director from the field coordinator.

9. The project director should have functional control over the treatment environment and be in a supervisory role over teachers.
10. Children selected for study should be screened to uncover potential problems in data collection that they might present.
11. Related pre- and post- measures should be taken both from the teacher and from the students.
12. Problem behaviors should be selected based on observational information as well as teacher interviews and ranking of behavior problems.
13. Data collection and observation systems should be so designed to remove logging-in problems among coders.
14. Teachers should be advised extensively and periodically regarding the necessity of accurate data collection, what to expect from classroom observers, and what to expect from coders.
15. Children should be involved in the change process through explanations and briefings, and feedback by experimenters where these are appropriate. A caution applies here, however, in that this may be a potential source of contamination.
16. Researchers considering the use of self control methodology in field studies are advised to establish a powerful external control program to use as a backup intervention in case of potential failure of self-monitoring techniques.

In conclusion, it is difficult to determine from this study the usefulness of using the CATTS system in conjunction with children's self-control programs. The procedural, logistical and methodological problems were far too numerous to provide an adequate assessment of this program. It is feasible that by providing teachers with immediate, computerized ongoing feedback on his/her performance, an effective approach to treatment may arise. However, the expense and inherent procedural problems in implementing this type of pro-

gram must be considered in planning future efforts.

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